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(54) IMPROVEMENTS RELATING TO CUTTING DEVICES FOR CIGARETTE AND LIKE ROD-MAKING MACHINES

(71) We, Molins Limited, a British COMPANY, OF ¼, Evelyn Street, Deptford, London SE8 5DH, do hereby declare this invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to a ledger for a cutting mechanism in a cigarette or filter-rod making machine, in which cigarettes or filters are manufactured in the form of a continuous rod which is then cut into short sections while moving axially. While the continuous rod is being cut, it must be properly supported to ensure that the cut is clean, and such support is commonly achieved by means of a ledger which consists of a pair of adjacent support members through which the rod passes in use, the members being spaced apart by a sufficient distance to allow a rotating knife to pass between them. The ledger must be arranged to move at substantially the same speed as the rod during each cutting operation, and to return to its initial position before the next such cutting operation, so its motion must be cyclic.

A ledger according to the invention comprises a rod support member mounted for side-to-side movement in the direction of rod motion, a pair of connecting rods of equal stroke length connected to the rod support member at upper and lower positions relatively, rotary drive means arranged to reciprocate the connecting rods in synchronism so that the rod support member is maintained in a substantially constant orientation throughout its motion, and means to constrain the rod support member against upward and downward movement.

Preferably the drive means comprises a pair of eccentrics, disc cranks, or crankshafts which may be driven by a common drive gear. Preferably the drive means are disc cranks which are mounted one above the other on horizontal shafts. Upward and downward movement of the rod support member is preferably constrained by a downwardly extending arm whose upper end is connected to the rod support member and whose lower end is connected to a fixed carrier. The arm is preferably rigid and is pivotally connected to the rod support member and fixed carrier; alternatively it may be flexible and have rigid connections with the rod support member and carrier.

In the first case, the lower pivotal connection may comprise a pair of crossed springs arranged as described in our G.B. Patent No. 1,000,174.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a partially cut away side elevation of a ledger according to the invention, and

Figure 2 is a partially sectioned side view taken in the direction of arrow A in Figure 1.

Referring to the drawings, the ledger includes an upright rod support member 2 comprising a beam having a bifurcated extension 4 at one side of its upper end, i.e. the side which is visible in Figure 1. Each arm 6 of the extension carries a tube member 8 through which the rod passes in use. The tube members extend towards one another across the gap between the arms 6 so as to leave a narrow gap 10 through which the knife 12, which rotates in the direction of arrow B in Figure 2, can pass to cut the rod. Each of the arm extensions 6 includes a socket to receive the tube member 8, and is split at 14 so that the tube member can be clamped into position by means of a screw 16 which extends across the split and is arranged to draw the sides of the split together when it is tightened.

In order to improve the mechanical balance of the device, the other side of the upper end of member 2 may be formed with a dummy rod-guide which is a mirror image of the arrangement described above as shown in Figure 2.

The member 2 is mounted on an upright arm 18 by means of a pivot pin 20 the outer ends of which are fixed into the side walls 22, 24 of the arm 18 at its upper end (Figure 2), and the central region of which is mounted in a bearing sleeve 26 which is fixed into the side walls 28, 30 of the member 2 at its upper end. The lower end 32 of the arm 18 is pivotally connected to a fixed carrier 34 by a "crossed-spring" assembly 36. This assembly comprises a pair of leaf spring members 38 and 40 which are slotted across their width so that one can fit through the other to assume the relationship shown in Figure 1. They are also connected together by means of a rigid right-angled bracket 42 which is bolted to the lower end 32 of the member 18 and another right-angled bracket 44, diagonally opposite the bracket 42, which is bolted to the fixed carrier 34. Since the upright member 2 is connected to the fixed carrier 34 via its pivoted connection 20 to the arm 18 and the flexible connection 36 between the arm and the carrier, it can describe a side-to-side movement whilst maintaining an upright position.

Vertical orientation of the member 2 is maintained and motion is transmitted to it by means of a pair of disc cranks 46 and 48 driven by a gear 50 mounted on a shaft positioned midway between the disc cranks and meshing with a drive gear 51 fixed to the shaft of each disc. A connecting rod 52 connects the upper disc crank 46 to the upper pivot 20 of the member 2, and a similar connecting rod 54 connects the lower disc crank 48 to a lower pivot 56 of the member 2.

Since the drive gear 50 meshes with similar gears on the shaft of each disc crank, the discs rotate synchronously. The throw of the connecting rods 52 and 54 is the same, and thus the member 2 is kept substantially vertical at all times.

In order to allow the ledger to be used when various different rod lengths are to be cut, the throw of the connecting rods is made adjustable by mounting each crank pin 58 on a counterweight body 60 whose position relative to the centre of rotation 62 of the disc is adjustable by means of a diametrally extending leadscrew 64. The leadscrew is threaded into a key 66 which is in the form of a rectangular block running in a keyway 68 in the disc through which the leadscrew extends. The outer face of the key 66 stands proud of the keyway 68 to mate with a groove (not shown) in the rear face of the counterweight 60, and is formed with a stud 70 which engages a socket in the groove so as to lock the key and the counterweight together.

The counterweight body can be securely clamped in position on the disc, once it has been adjusted, by means of bolts 72 passing through elongate holes 74 and threaded into the disc. The leadscrew is locked into position after adjustment by means of a split pin passed through a diametral aperture (not shown) in a nut 76 and through a corresponding aperture in the end of the leadscrew.

Because the movement of the counterweight 60 effects the balance of the mechanism only a limited range of adjustment can be provided using a single counterweight, but the required range of possible stroke adjustment, and therefore rod lengths, is allowed for by means of different counterweights whose mass is distributed suitably in each case, for a particular range of stroke settings.

In the embodiment shown the disc cranks 46 and 48 are arranged to rotate in the same sense by virtue of the gear 50 which drives both of them. It will be appreciated that they could alternatively be arranged to rotate in opposite senses, provided the movement is synchronised at the position shown in the drawing and provided, of course, that they rotate at the same speed, so that the horizontal movement of the connecting rods is in step. This could be achieved for example by applying the drive directly to one of the shafts and gearing the two shafts directly together with gears of the same size.

WHAT WE CLAIM IS:

1. A ledger for the cutting mechanism of a continuous rod-making machine, comprising a rod support member mounted for side-to-side movement in the direction of rod motion, a pair of connecting rods of equal stroke length connected to the rod support member at upper and lower positions respectively, rotary drive means arranged to reciprocate the connecting rods in synchronism so that the rod support member is maintained in a substantially constant orientation throughout its motion, and means to constrain the rod support member against upward and downward movement.

2. A ledger according to claim 1 in which the rotary drive means comprises a respective disc crank for each of the connecting rods.

3. A ledger according to claim 1 in which the rotary drive means comprises a respective eccentric member for each of the connecting rods.

4. A ledger according to claim 1 in which the rotary drive means comprises a

respective crankshaft for each of the connecting rods.

5. A ledger according to any preceding claim in which the means to constrain the rod support member against upward and downward movement comprises a downwardly extending arm whose upper end is connected to the rod support member and whose lower end is connected to a fixed carrier.

6. A ledger according to claim 5 in which the arm is rigid and is connected to the rod support and the fixed carrier by means of respective pivotal connections.

7. A ledger according to claim 6 in which the lower pivotal connection includes a resilient member comprising a pair of crossed springs.

8. A ledger according to claim 5 in which the downwardly extending arm is flexible and is connected to the rod support and the fixed carrier by means of respective rigid connections.

9. A ledger according to claim 2 in which the crank pin of each disc crank is adjustable in distance from the centre of rotation of the disc so as to provide adjustment of the throw of each connecting rod.

10. A ledger according to claim 2 in which the disc cranks are geared together so as to rotate in the same direction.

11. A ledger according to claim 2 in which the disc cranks are geared together so as to rotate in opposite directions.

12. A ledger substantially as herein described with reference to the accompanying drawings.

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1556267 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

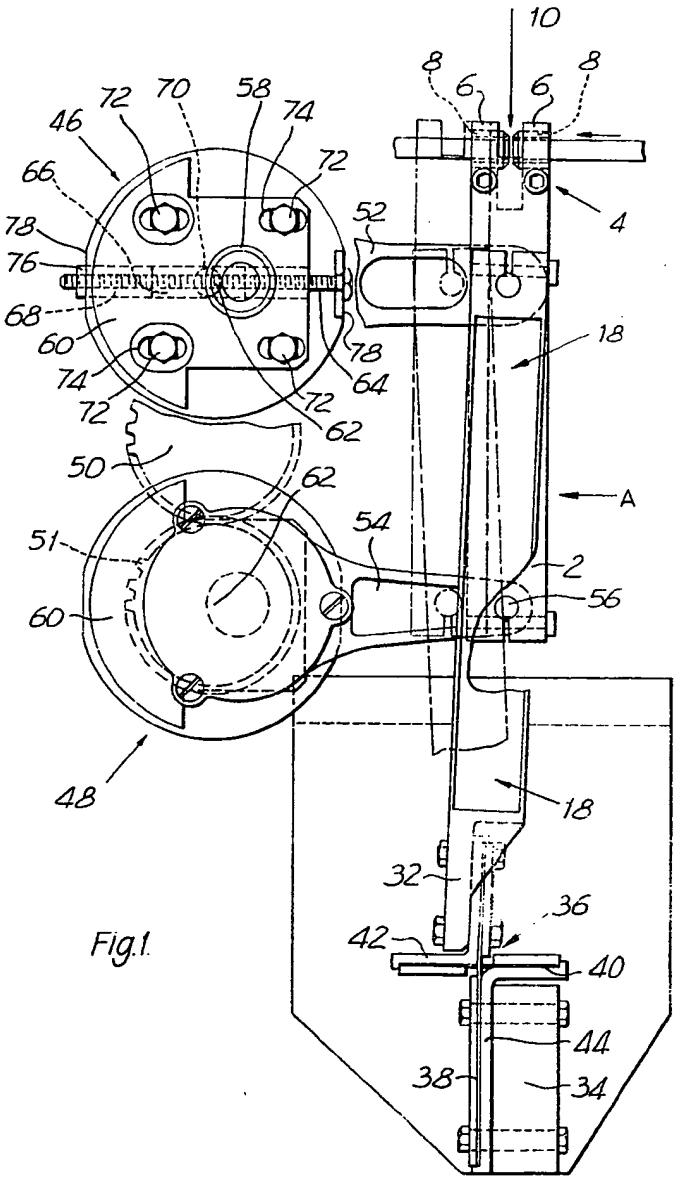

Fig.1.

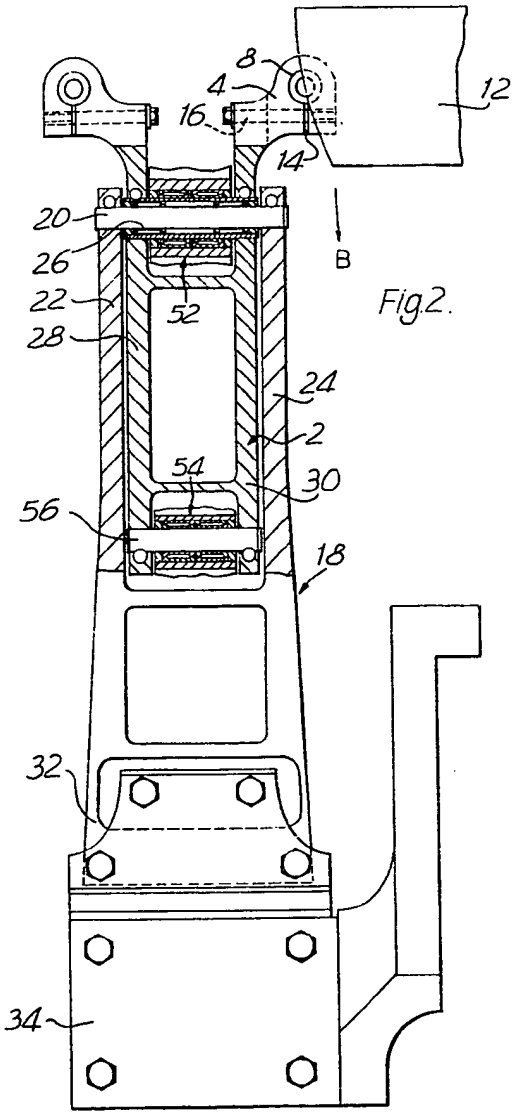

Fig.2.